

2.0 Methodology

A variety of field survey methods were used to sample the mammal populations at the four alternative sites. Preliminary research included general literature searches, consultation with agency and species experts, aerial photo habitat interpretations, and landowner interviews. In addition, DFG biologists reviewed the Natural Diversity Data Base; Wildlife Habitat Relationship System; the Federal Register of Threatened, Endangered, and Special Status Species; the 1983 *Thomes-Newville Status Report*; and the 1987 *Final Report on Reconnaissance Level Studies of the Fish and Wildlife Resources at the Dippingvat and Schoenfield Reservoir Sites* to gather additional species information for each project area. A list was then compiled which included the following list of potentially occurring special status species of mammals. While the species listed below remain the focus of survey efforts, sampling has been designed to include the detection and assessment of all mammal species. Detailed life histories for each of these species are included in Section 6.0.

- Yuma myotis (*Myotis yumanensis*) a U.S. Fish and Wildlife Service “Federal Special Concern Species” and a DFG “California Species of Special Concern”;
- Long-eared myotis (*Myotis evotis*) a USFWS “Federal Special Concern Species”;
- Fringed myotis (*Myotis thysanodes*) a USFWS “Federal Special Concern Species”;
- Long-legged myotis (*Myotis volans*) a USFWS “Federal Special Concern Species”;
- Small-footed myotis (*Myotis ciliolabrum*) a USFWS “Federal Special Concern Species”;
- Western red bat (*Lasiurus blossevillii*) a U.S. Forest Service “Sensitive Species”;
- Spotted bat (*Euderma maculatum*) a USFWS “Federal Special Concern Species” and a DFG “California Species of Special Concern”;
- Pale big-eared bat (*Corynorhinus townsendii pallescens*) a USFWS “Federal Special Concern Species,” a DFG “California Species of Special Concern,” and a USFS “Sensitive Species”;
- Townsend’s western big-eared bat (*Corynorhinus townsendii townsendii*) a USFWS “Federal Special Concern Species,” a DFG “California Species of Special Concern,” and a USFS “Sensitive Species”;
- Pallid bat (*Antrozous pallidus*) a DFG “California Species of Special Concern,” and a USFS “Sensitive Species”;
- Greater western mastiff bat (*Eumops perotis californicus*) a USFWS “Federal Special Concern Species” and a DFG “California Species of Special Concern”;
- San Joaquin pocket mouse (*Perognathus inornatus inornatus*) a USFWS “Federal Special Concern Species”;

- Ringtail (*Bassariscus astutus*) a DFG “California Fully Protected Species”;
- Pine marten (*Martes americana*) a USFS “Sensitive Species”;
- Pacific fisher (*Martes pennanti pacificus*) a USFWS “Federal Special Concern Species,” a DFG “California Species of Special Concern,” and a USFS “Sensitive Species”; and
- American badger (*Taxidea taxus*) a DFG “California Species of Special Concern”.

After the development of the species list, field surveys were designed to assess the presence, distribution, and, where possible, the relative abundance of the mammal species within the four alternatives. Field investigation methods included small mammal live trapping, mist netting, acoustical surveys, roost and hibernacula searches, track plates, photo stations, spotlighting, general habitat measurements, walking transects, road transects, and incidental observations.

2.1 Small Mammal Trapping

H.B. Sherman® live traps were used to inventory the small mammal (rodent) populations (Davis 1982; Teitje et al. 1997). The trap size used was 3 by 3.5 by 9 inches, the standard for conducting small mammal inventories. Traps were set for three consecutive nights and checked and closed every morning at sunrise. All captures were identified, measured, marked, recorded on data sheets, and released back in the field. Marks consisted of clipping fur on individuals (Nietfeld et al. 1996). Traps were baited with a mixture of bird seed and crushed walnuts each afternoon approximately one half hour before sunset. To reduce the risk of contracting Hantavirus Pulmonary Syndrome or other zoonotic diseases, field personnel were required to wear full face respirators while checking traps and handling captures. In addition, the traps were sterilized at the end of each week with a dilute solution of bleach, a common technique that does not affect trapping success (Yunger and Randa 1999). The 1997 and 1998 surveys specifically targeted habitat areas identified from aerial photo interpretations that appeared to have the greatest suitability for the target species. Those areas were ground checked and surveyed with high densities of traps to maximize capture success of potentially occurring special status species such as the San Joaquin pocket mouse.

During the 1998 and 1999 efforts, large trapping grids were implemented. Trapping locations, or grids, were randomly selected from each of the habitat types and designed so that the number of samples represented the amount and coverage area for each of the habitat types on the alternatives, a technique known as stratified sampling (Jones et al. 1996; Thompson et al. 1998).

The trapping grids consisted of 200 traps within a 100-by-100 meter square. The grids were established by field crews using a compass and 100-meter tape. Various colors of pin flags were used to mark the grids. One pin flag was placed every 10 meters on the grid and two traps were set within 2 meters of each point (pin flag) on the grid.

Each capture was placed in a handling bag and immediately processed. Captures were all identified, measured, marked, and recorded on data sheets.

Scissors were used to cut fur from the hind quarters of each individual capture. This provided an easy and effective marking technique for recapture studies necessary to determine the relative abundance of small mammals.

2.2 Mist Netting

Mist nets were the primary method of inventorying bat species (Jones et al. 1996). Mist nets are panels of various thread weights, mesh sizes, lengths, and heights that are deployed above the ground between two poles. Nets were set over water sources (i.e., ponds, creeks, or water troughs), across draws or narrow canyons, in front of entrances of old buildings, along woodland or forest edges, and in small clearings within a woodland or forest. Various net sizes and configurations were used. The primary configuration used was a single net or several single nets spaced throughout an area. Other net configurations included “joining” several nets together and arranging them to form V, L, and T shapes. These configurations were used primarily in areas where there was a lot of known bat activity but where previous capture efforts failed.

All captures were removed from the nets immediately upon capture and placed in a handling bag for later processing. Processing was conducted at the conclusion of netting efforts or when bat activity became slow. This reduced the potential for multiple capture of individuals of any particular species. Captures were all identified, measured, recorded on data sheets, recorded on the Anabat Detector, and released back into the field.

2.3 Acoustical Surveys

The Anabat Detector, Zero Crossing Analysis Interface Module, and software with a lap top computer or tape recorder (collectively referred to as Anabat) was used to conduct acoustical surveys for free-flying bat species. The Anabat is a device that detects the ultrasound produced by free-flying bats (Corben et al. 1999; Oliveira 1998) using a technique called Zero Crossing Analysis, frequency-time graphs. Free-flying bats are difficult to survey and capture and acoustical surveys can greatly increase the detection of bat species in a survey area (O’Farrell and Gannon 1999). The Anabat was primarily used to record free-flying bats at the net sites during the initial efforts. As the studies progressed, other survey techniques were implemented. These techniques included recording while night driving and/or walking and at stationary points. Walking and driving surveys helped field crews identify potential trapping sites. When bats were detected, crews stopped for one minute and continued recording. If bat activity continued, an additional five minutes of recording was conducted. Those areas with a great amount of bat activity were mapped for future trapping efforts since long periods of activity probably equates with some significance to the area, either as a foraging area or a roost location. The recordings were saved with pertinent information (i.e., location, date, species if known, and habitat) to the computer for later review and processing.

2.4 Roost Searches

Visual surveys were conducted during the daytime hours in rock outcroppings, outbuildings, tree cavities, woodlands, and snags for evidence of bat presence (Davis 1982; Kunz et al. 1996). Visual inspections, with the aid of a flashlight if needed, of a rock crevice or tree cavity enabled field personnel to locate potential and existing roosts. The location of the site was recorded and if the bat could be identified without much disturbance, the species was recorded. No bats were removed from the roost because of the potential of disturbing them to the point of roost abandonment.

2.5 Track Plates

Track plates were used to identify the presence of carnivores such as the marten and fisher (Wemmer et al. 1996; Zielinski and Kucera 1995). Two types of track plate setups were used. Both setups used aluminum plates but involved different configurations. One type consisted of stop sign blanks laid on a relatively flat surface. The other consisted of a 10-inch-by-30-inch plate inside a wooden shelter with open ends. The box type was set against an object (a tree, log, rock) and camouflaged with sticks and logs. Both types were coated with a mixture of blue carpenter's chalk and alcohol (two parts of alcohol to one part chalk). The stop sign blanks were completely coated, and bait was placed in the center of the plate. Track impressions were created when an animal walked across the plate to the bait, picking up the chalk with the pads of its feet. The smaller, rectangular plates were coated over approximately two-thirds of its length. On the other one-third of the plate, a piece of white contact paper was placed sticky side up adjacent to the chalk. The bait was placed at the end of the plate beyond the contact paper. The plate was placed in the wooden shelter with the bait at the obstructed end. Track impressions were created when an animal walked across the plate and then again by walking across the sticky contact paper with powdered feet to get to the bait. The baits used included chicken parts or pieces or approximately 1-1/2 ounces of canned mackerel.

Track plates were placed at intervals of approximately 1,000 meters and were set for at least 10 consecutive days. The plates were checked approximately every two days by field staff. Checking included recording tracks as well as rechalking and rebaiting as needed. All tracks were measured, identified, and recorded on data sheets. Tracks left on the plates were transferred to data sheets by lifting them with the sticky side of clear tape and taping them to data sheet. When tracks were left on the contact paper the paper was removed, labeled, and placed in a document protector, and a clean, new piece of contact paper was placed on the plate.

2.6 Camera Stations

Two types of camera surveys were conducted. Both were used to survey for carnivores in a method similar to the track plates (Wemmer et al. 1996; Zielinski and Kucera 1995). One was the Trailmaster® Camera, which took 35mm still photos. Two types of Trailmaster sensors were used, infrared and motion

sensors. When triggered, the sensors sent a signal to the camera, which then took a photograph. The other type was a video surveillance camera that took 8mm video for pre-determined lengths of time. The video was triggered by two motion sensors. Both camera types were baited with canned mackerel, commercial baits or scents, chicken, road kill deer, or fish.

Each event (detection by the sensor) was recorded in the sensors' memory, which also differentiated which events were photographed. The camera setups were checked at various intervals and were dependent upon the amount of activity at each site by field personnel and recorded on data sheets. Once a roll of film or videocassette was shot, the film was removed, replaced, and taken for development or reviewed on a VCR. The photos were labeled, identified, and filed at the DFG office.

2.7 Spotlighting

Spotlight surveys were conducted by two- or three-person crews using hand held Q-beam spotlights (250,000 to 1,000,000 candlepower) from a vehicle traveling between 10 and 15 miles per hour. When eye shine was detected, the vehicle was stopped and personnel identified the species with the aid of binoculars or a spotting scope when possible. Eye shine characteristics such as color, body size, and general behavior of the animal were useful in identifying species (Morrel 1972). Information such as location, habitat, species, time, distance traveled on the route, and weather were recorded on data sheets each night. All accessible roads in the study areas were included in spotlight surveys. Surveys began approximately a half hour after sunset and concluded at approximately midnight.

2.8 General Habitat Measurements and Assessment

General habitat measurements were conducted primarily to assist with future efforts on a HEP. Detailed vegetative inventories were conducted by California Department of Resources staff. Our studies focused primarily on identifying the presence of habitat features such as snags, logs, burrows, and basic vegetation measurements such as heights and canopy cover while conducting other surveys such as trapping or track plating. This information was recorded and will be used in the future when the HEP Team is developed and begins the HSI Model selection process.

During the track plate and photo station surveys, biologists assessed potential pine marten (*Martes americana*) and Pacific fisher (*Martes pennanti pacificus*) habitat areas that were identified from aerial photos. This ground truthing consisted of conducting basic forest measurements such as species composition and percent canopy cover. The measurements were recorded and assessments were recorded in field notebooks.

2.9 Walking Transects

Field personnel conducted walking transects throughout the different habitat types on the project areas. This effort was designed and implemented

specifically to detect badger denning sites and rodent burrow areas (Wemmer et al. 1996). Field personnel performed walking transects between 10 and 50 meters (33 and 164 feet) apart depending on terrain and ground cover. All potential denning sites and burrow areas were measured, mapped, counted, and recorded.

2.10 Incidental Observations

Incidental observations were recorded by field personnel while conducting other, more formal surveys. Observations from field personnel conducting surveys for other disciplines such as botany, birds, fish, and herp (reptiles and amphibians) were also reported to DFG and recorded. Reports and sightings from other field personnel were verified where possible.

3.0 Results

This section includes all data recorded from the field investigations at the four alternatives through December 31, 1999. Field studies are currently on hold because access is not available at this time. The results are discussed below by project area and methodology. In addition, the level of effort varied greatly on each alternative because of budgetary and access constraints. These issues will be discussed in detail in Sections 4.0 Summary and 5.0 Recommendations.

3.1 Sites Reservoir

Biologists recorded 32 mammal species using the Sites Project area during the course of our studies (Appendix A). Research prior to our initial field efforts included literature and database searches which found evidence of historical occurrences in or near the project area of three special status species: the Townsend's western big-eared bat (*Corynorhinus townsendii townsendii*) a U.S. Fish and Wildlife Service Federal Special Concern Species, DFG California Species of Special Concern, and U.S. Forestry Service Sensitive Species; San Joaquin pocket mouse (*Perognathus inornatus inornatus*) a USFWS Federal Special Concern Species; and Pacific fisher (*Martes pennanti pacificus*) a USFWS Federal Special Concern Species, DFG California Species of Special Concern, and USFS Sensitive Species. In addition, field investigations identified habitat that could potentially support 13 additional special status species. See Section 2.0 for a complete list of those potentially occurring species. Surveys, thus far, have resulted in the documentation of five of those species: the pallid bat (*Antrozous pallidus*); western red bat (*Lasiurus blossevillii*); Yuma myotis (*Myotis yumanensis*); ringtail (*Bassariscus astutus*); and American badger (*Taxidea taxus*).

3.1.1 Small Mammal Trapping

A total of 550 trap nights of effort was expended prior to April 1, 1999, to detect the presence of the San Joaquin pocket mouse. Following April 1, 1999, trapping grids were implemented to document all small mammals and survey all of the habitat types. An additional 6,800 trap nights have been expended to assess the distribution and relative abundance of small mammals.

The 7,350 total trap nights resulted in the 275 captures. This represents a 3.7 percent trapping success. The most commonly trapped species was the deer mouse (*Peromyscus maniculatus*) (Table 3.1.1).

3.1.2 Mist Netting

A total of 147 hours of mist netting effort was expended to detect the bat species present on the project area. Nets were typically monitored from sunset to approximately midnight. Surveys were conducted over water sources (i.e., ponds, permanent or intermittent streams and creeks, and water troughs), near forest or woodland edges, at openings to outbuildings, and across canyons and steep draws. All together, five bat species were captured.

Table 3.1.1 Small mammal trapping results for the Sites Project area.

Species	Number Trapped	Percent of catch
Deer mouse	196	71
Pinon mouse	3	1
Brush mouse	9	3
Western harvest mouse	43	16
California vole	5	2
Ornate shrew	1	<1
Vagrant shrew	1	<1
House mouse	17	6
TOTALS	275	100

The most commonly caught species was the pallid bat (*Antrozous pallidus*) (Table 3.1.2). In addition, we know that there are breeding populations of pallid and western red bats within the project area because of the presence of pregnant and lactating females, adult males, and juveniles.

Table 3.1.2 Mist netting results for the Sites Project area.

Species	Number caught	Percent of capture
Pallid bat	10	45
Yuma myotis	1	5
Western pipistrelle	6	27
Western red bat	4	18
Little brown bat	1	5
TOTALS	22	100

3.1.3 Acoustical Surveys

A total of 99 hours of acoustical surveys were expended to survey free-flying bat species on the Sites Project area. These surveys detected two additional species that were not documented with the mist netting efforts, the Mexican free-tailed bat (*Tadarida brasiliensis*) and big brown bat (*Eptesicus fuscus*). In addition, acoustical surveys provided valuable planning information for biologists by identifying areas of high activity. Those areas of high activity were recorded, mapped, and visited during the daytime to see what, if any, features were present. Depending upon the site, mist netting efforts could then be implemented to capture bats using those areas of high activity. A complete list of species detected with the Anabat is not available at this time because the calls are still being analyzed.

3.1.4 Roost Searches

A total of 32 hours was expended to locate active and/or potential bat roost sites on the Sites Project area. To date, seven buildings, three bridges, four rock outcrop areas, and 18 tree cavities were searched and/or monitored for bat use. So far, five active day roosts and one active night roost have been identified. At least three different species have been identified using the roosts, pallid bats (*Antrozous pallidus*), western pipistrelle (*Pipistrellus hesperus*), and myotis species (*Myotis sp.*). Species observed at the roosts were visually identified, where possible, with minimal disturbance and not handled. This practice was conducted so as not to disturb the bats to the point of roost abandonment, which has been a major factor in the decline of many bat species in California.

3.1.5 Track Plates

A total of 209 nights of effort was expended to detect the presence of medium-sized mammals: 9 nights in chaparral, 53 in riparian, 103 in oak savanna, and 44 in oak woodland. Surveys resulted in a total of 22 detections. The most commonly detected species was the raccoon (*Procyon lotor*) (Table 3.1.3). Attachment B contains some representative tracks from the track plates.

Table 3.1.3 Track plate results in the Sites Project area.

Species	Number Detected
Raccoon	12
Mouse sp.	4
Western striped skunk	3
Bobcat	1
Ground squirrel	1
Ringtail	1
TOTALS	22

3.1.6 Photo Stations

A total of 66 nights of effort was expended to detect the presence of medium-sized mammals; 51 nights in oak savanna and 15 nights in oak woodland. This technique was conducted in conjunction with the track plate efforts. Surveys resulted in a total of 21 detections: 1 coyote, 1 raccoon, 5 pigs, and 14 cows. Attachment C contains some representative photographs from the photo stations.

3.1.7 Spotlighting

The primary focus has been on identifying suitable routes for implementing standardized, permanent spotlighting efforts. Biologists mapped potential routes and classified them based upon the type of road (county, private, gravel, paved, dirt, etc.). While there are fairly extensive road systems throughout the project area, fairly major portions of the potential routes will only be accessible

seasonally unless some improvements are made. Three potential routes have been identified (Figure 5), of which, only two may be partially accessible year round without improvements.

Preliminary spotlighting efforts detected the presence of the American badger (*Taxidea taxus*). Other species commonly encountered while spotlighting included black-tailed hares (*Lepus californicus*), coyotes (*Canis latrans*), and kangaroo rat species (*Dipodomys* species).

3.1.8 Habitat Assessment

While conducting the track plates and photo stations, it was determined that no suitable habitat for the pine marten (*Martes americana*) and Pacific fisher (*Martes pennanti pacificus*) occurs within the Sites Reservoir footprint. The site is dominated by grasslands, forested only on the west and southeast margins interspersed oak woodlands and savannas. The pine marten (*Martes americana*) prefers dense, late-successional coniferous forests with thick understories (see Section 6.14 for the complete life history of the pine marten) which are not present in this alternative. The Pacific fisher (*Martes pennanti pacificus*) prefers large stands of mature trees with at least 50 percent canopy cover, typically coniferous and hardwood forests (see Section 6.15 for the complete life history of the Pacific fisher) which only occurs sporadically in this alternative.

3.2 Colusa Cell

Biologists recorded a total of 19 different mammal species using the Colusa Cell Project Area during our studies (Attachment A). Because the Colusa Cell Project Area is an extension of the Sites Project, the preliminary research results for special status species were the same as those for Sites discussed above. In addition, field investigations have identified habitat that could potentially support the special status species mentioned for Sites as well. Surveys have resulted in the documentation of two of those species: the pallid bat (*Antrozous pallidus*) and American badger (*Taxidea taxus*).

3.2.1 Small Mammal Trapping

A total of 192 trap nights of effort were expended prior to April 1, 1999, in attempt to detect the presence of the San Joaquin pocket mouse in the grassland habitat. Following April 1, 1999, trapping grids were implemented to document all the small mammals and survey all of the habitat types. An additional 2,400 trap nights have been expended to assess the distribution of small mammals, 1,800 trap nights in grassland, and 600 in oak woodland.

The 2,592 total trap nights resulted 81 captures in the project area. This represents a 3.1 percent trapping success. The most commonly trapped species was the deer mouse (*Peromyscus maniculatus*) (Table 3.2.1).

Table 3.2.1 Small mammal trapping results for the Colusa Cell Project area.

Species	Number Trapped	Percent of catch
Deer mouse	66	81.5
Brush mouse	4	5
Western harvest mouse	6	7.5
California kangaroo rat	3	4
House mouse	1	1
Vagrant shrew	1	1
TOTALS	81	100

3.2.2 Mist Netting

A total of 60 hours of mist netting effort was expended to detect the presence of bat species on the Colusa Cell Project area. Nets were typically monitored from sunset to approximately midnight. Surveys were conducted over water sources (i.e., ponds, permanent or intermittent streams and creeks, and water troughs), near forest or woodland edges, at openings to outbuildings, and across canyons and steep draws. Two bat species were captured, 24 pallid bats (*Antrozous pallidus*) and one Yuma myotis (*Myotis yumanensis*). We also know that there are breeding populations within the project area because of the presence of pregnant and lactating females, males, and juveniles.

3.2.3 Acoustical Surveys

A total of 34 hours of acoustical surveys were expended to survey free-flying bat species on the Colusa Cell Project area. These surveys resulted in the detection of two additional species that were not documented with the mist netting efforts, the Mexican free-tailed bat (*Tadarida brasiliensis*) and western pipistrelle (*Pipistrellus hesperus*). In addition, acoustical surveys provided valuable planning information for biologists by identifying areas of high activity. Those areas of high activity were documented and then visited during the daytime to see if any features (potential roosts or foraging areas) were present. Depending

upon the site, mist netting efforts could then be implemented to capture bats using those areas of high activity. A complete list of species detected with the Anabat is not available at this time because calls are still being analyzed.

3.2.4 Roost Searches

A total of 27 hours was expended to locate active and/or potential bat roost sites on the Colusa Cell Project Area. To date, 11 buildings, 2 bridges, and 2 rock outcrop areas were searched and/or monitored for bat use. So far, biologists have identified one active night which may also be a maternity colony of pallid bats. At least three different species have been identified using the roosts, pallid bats (*Antrozous pallidus*), western pipistrelle (*Pipistrellus hesperus*), and myotis species (*Myotis sp.*). Species observed at the roosts were visually identified, where possible, with minimal disturbance and not handled. This practice was conducted so as not to disturb the bats to the point of roost abandonment, which has been a major factor in the decline of many bat species in California.

3.2.5 Track Plates

This survey technique was not conducted on the Colusa Cell Project area. The primary targets of this technique were the pine marten (*Martes americana*) and Pacific fisher (*Martes pennanti pacificus*), both of which do not inhabit grassland habitats which is the dominant plant community in the area. More discussion is provided in Section 3.2.8.

3.2.6 Photo Stations

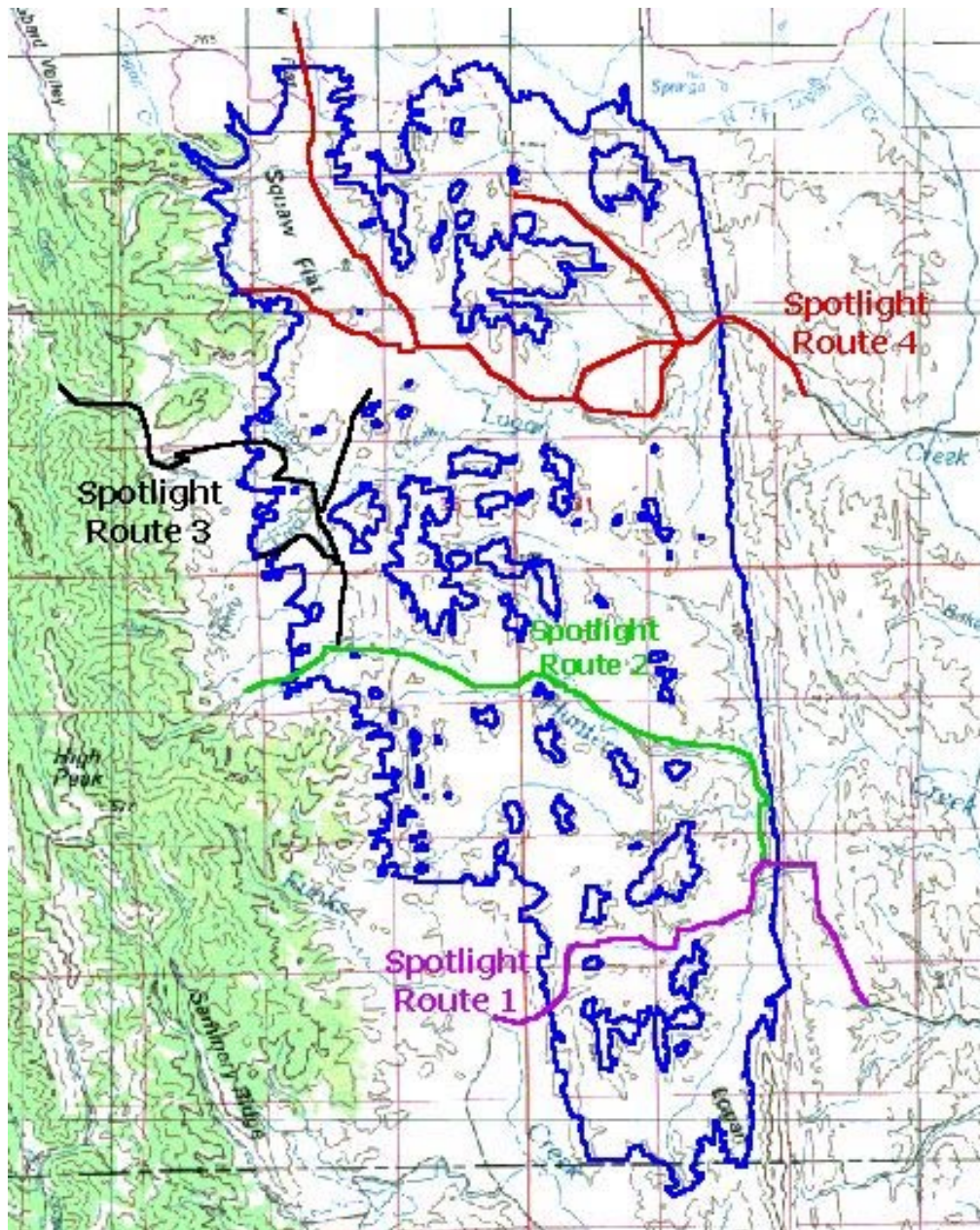
This technique was not conducted on the Colusa Cell Project area for the same reasons as discussed in Section 3.2.5.

3.2.7 Spotlighting

The primary focus has been on identifying suitable routes for implementing standardized, permanent spotlighting efforts. Biologists mapped potential routes and classified them based upon the type of road (county, private, gravel, paved, dirt, etc.). While there are fairly extensive road systems throughout the project area, the majority of the potential routes will most likely only be accessible seasonally unless some improvements are made to them. Four potential routes have been identified (Figure 6), of which, only portions of each may be accessible year round without some improvements.

Preliminary spotlighting efforts detected the presence of the American badger (*Taxidea taxus*). Other species commonly encountered while spotlighting included black-tailed hares (*Lepus californicus*), coyotes (*Canis latrans*), and kangaroo rat species (*Dipodomys* species.).

Figure 6. Potential spotlight routes on the Colusa Cell Project area.



3.2.8 Habitat Assessment

Aerial photo interpretations determined that no suitable habitat for the pine marten (*Martes americana*) and Pacific fisher (*Martes pennanti pacificus*) occurs within the Colusa Cell footprint. The site is dominated by grasslands with only small, sporadic patches of wooded habitats which is not suitable habitat for the pine marten (*Martes americana*) or Pacific fisher (*Martes pennanti pacificus*). The pine marten (*Martes americana*) prefers dense, late-successional coniferous forests with thick understories (see Section 6.14 for the complete life history of the pine marten) which are not present in this alternative. The Pacific fisher prefers large stands of mature trees with at least 50 percent canopy cover, typically coniferous and hardwood forests (see Section 6.15 for the complete life history of the Pacific fisher) which only occurs in small, sporadic patches in this alternative.

3.3 Thomes-Newville Reservoir

Biologists recorded a total of 32 different mammal species using the Thomes-Newville Project area (Attachment A). It should be noted that some of these sightings were from efforts during the early 1980s when extensive surveys were conducted. Those studies, however, focused primarily on deer herds and birds so limited field surveys were conducted for other mammals.

Preliminary research prior to our initial efforts, which included literature and database searches, found evidence of past occurrences in or near the project area of one special status species; the Pacific fisher (*Martes pennanti pacificus*) (USFWS Federal Special Concern Species, DFG California Species of Special Concern, and USFS Sensitive Species). In addition, field investigations have identified habitat which could potentially support 15 additional special status species. See Section 2.0 for a complete list of those potentially occurring species. Surveys resulted in the documentation of two of those species: the San Joaquin pocket mouse (*Perognathus inornatus inornatus*) and the Yuma myotis (*Myotis yumanensis*).

3.3.1 Small Mammal Trapping

A total of 160 trap nights of effort were expended prior to April 1, 1999, to detect the presence of the San Joaquin pocket mouse in the grassland habitat. Following April 1, 1999, trapping grids were implemented to document all the small mammals and survey all of the habitat types. An additional 3,090 trap nights have been expended to assess the presence and distribution of small mammals, 2,660 trap nights in grassland, 400 in oak savanna, and 190 in oak woodland.

The 3,250 total trap nights resulted in 179 captures in the project area. This represents a 5.5 percent trapping success. The most commonly trapped species was the deer mouse (*Peromyscus maniculatus*) (Table 3.3.1).

Table 3.3.1 Small mammal trapping results for the Thomes-Newville Project area.

Species	Number Trapped	Percent of catch
Deer mouse	117	65
Brush mouse	1	<1
San Joaquin pocket mouse	5	3
Western harvest mouse	25	14
California vole	11	6
House mouse	5	3
California kangaroo rat	15	8
TOTALS	179	100

3.3.2 Mist Netting

A total of 39 hours of mist netting effort was expended to detect the presence of bat species on the Thomes-Newville Project area. Nets were typically monitored from sunset to approximately midnight. Surveys were conducted over water sources (i.e., ponds, permanent or intermittent streams and creeks, and water troughs), near forest or woodland edges, at openings to outbuildings, and across canyons and steep draws. Two bat species were captured, the big brown bat (*Eptesicus fuscus*) and Yuma myotis (*Myotis yumanensis*).

3.3.3 Acoustical Surveys

A total of 42 hours of acoustical surveys were expended to survey free-flying bat species on the Thomes-Newville Project area. These surveys detected two species, the Mexican free-tailed bat (*Tadarida brasiliensis*) and western pipistrelle (*Pipistrellus hesperus*). In addition, acoustical surveys provided valuable planning information for biologists by identifying areas of high activity. Those areas of high activity were documented and then visited during the day to see what, if any, features were present. Depending upon the site, mist netting efforts could then be implemented to capture bats using those areas of high activity. A complete list of species detected with the Anabat is not available at this time because calls are still being analyzed.

3.3.4 Roost Searches

A total of 27 hours was expended to locate active and/or potential roost sites on the Thomes-Newville Project area. Three buildings, four bridges, seven rock outcrop areas, and four tree cavities were searched and/or monitored for bat use. Biologists were unsuccessful in identifying active roost sites.

3.3.5 Track Plates

A total of 211 nights of effort was expended to detect the presence of medium-sized mammals: 146 nights in grassland and 45 in oak savanna. The primary targets of this technique were the pine marten (*Martes americana*) and

Pacific fisher (*Martes pennanti pacificus*). Surveys resulted in 22 detections (Table 3.3.2). Attachment B contains some representative tracks from the track plates.

Table 3.3.2 Track plate results for the Thomes-Newville Project area.

Species	Number Detected
Raccoon	7
Mouse sp.	6
Bobcat	3
Domestic cat	3
Ground squirrel	2
Woodrat	1
TOTALS	22

3.3.6 Photo Stations

A total of 93 nights of effort was expended in conjunction with the track plate efforts, 17 nights in foothill pine, eight in oak savanna, 57 in oak woodland, and 11 in riparian. Surveys resulted in 17 detections (Table 3.3.3). Attachment C contains some representative photographs from the photo stations.

3.3.7 Spotlighting

The primary focus has been on identifying suitable routes for implementing standardized, permanent spotlighting efforts. Biologists have mapped potential routes and classified them based upon the type of road (county, private, gravel, paved, dirt, etc.). While there are fairly extensive road systems throughout the project area, the majority of potential routes will most likely only be accessible seasonally unless some improvements are made. Eight potential routes have been identified (Figure 7) of which only three may be accessible year round. The other five may require some improvements to provide access.

Preliminary spotlighting efforts have been successful in detecting the presence of coyotes (*Canis latrans*), black-tailed hares (*Lepus californicus*), and black-tailed mule deer (*Odocoileus hemionus columbianus*).

Table 3.3.3 Photo station results for the Thomes-Newville Project area.

Species	Number Detected
Black-tailed deer	10
Golden Eagle	2
Gray fox	2
Western striped skunk	1
Western gray squirrel	1
Black bear	1
TOTALS	17

3.3.8 Habitat Assessment

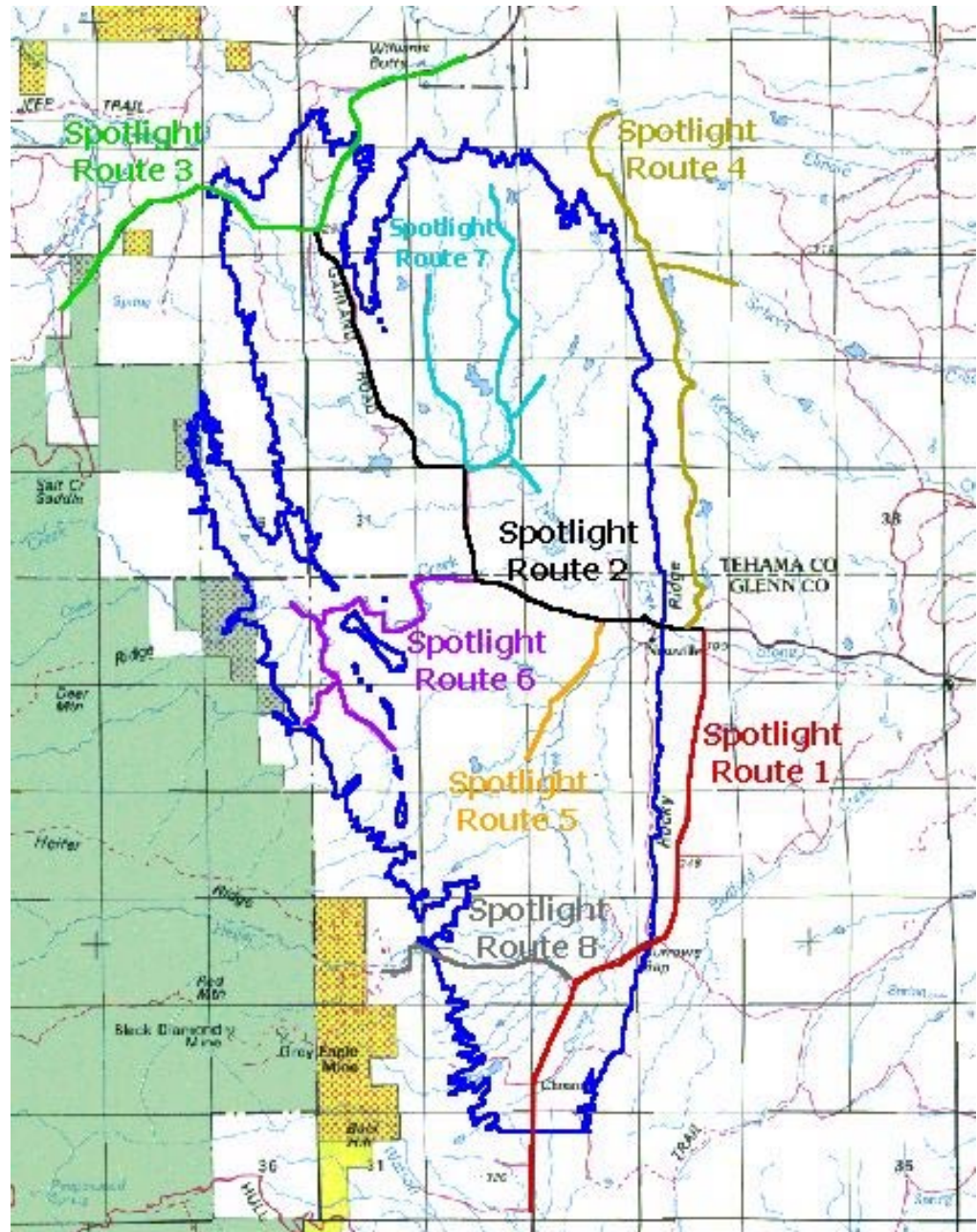
While conducting the track plates and photo stations, it was determined that no suitable habitat for the pine marten (*Martes americana*) and Pacific fisher (*Martes pennanti pacificus*) occurs within the Thomes-Newville Reservoir footprint. The site is dominated by grasslands, forested on the margins by relatively open oak woodlands with patches of foothill pine and ceanothus. The pine marten (*Martes americana*) prefers dense, late-successional coniferous forests with thick understories, which are not present in this alternative (see Section 6.14 for the complete life history of the pine marten). The Pacific fisher (*Martes pennanti pacificus*) prefers large stands of mature trees with at least 50 percent canopy cover, typically coniferous and hardwood forests, which occur in this alternative but in open stands with less than 50 percent canopy cover (see Section 6.15 for the complete life history of the Pacific fisher).

3.4 Red Bank Reservoir

Biologists recorded a total of 31 different mammal species using the Red Bank Project area during our studies (Attachment A). It should be noted that some of these sightings were from survey efforts conducted during the mid-1980s to investigate the potential impacts of the Dippingvat and Schoenfield Reservoirs.

Preliminary research prior to DFG's initial efforts, which included literature and database searches, found evidence of past occurrences in or near the project area of one special status species: the pale big-eared bat (*Corynorhinus townsendii pallascens*) (USFWS Federal Special Concern Species, DFG California Species of Special Concern, and USFS Sensitive Species). In addition, field investigations have identified habitat which could potentially support 15 additional special status species. See Section 2.0 for a complete list of those potentially occurring species. Surveys thus far have resulted in the documentation of two of those species: the Yuma myotis (*Myotis yumanensis*) and pallid bat (*Antrozous pallidus*).

Figure 7. Potential spotlight routes on the Thomes-Newville Project area.



3.4.1 Small Mammal Trapping

A total of 198 trap nights of effort was expended prior to April 1, 1999, to detect the presence of the San Joaquin pocket mouse in the grassland habitat. Following April 1, 1999, trapping grids were implemented to document all the small mammals and survey all of the habitat types. An additional 132 trap nights were expended to assess the presence, distribution, and relative abundance of small mammals.

The 330 total trap nights resulted in a total of 25 captures in the project area. This represents a 7.6 percent trapping success. The most commonly trapped species was the deer mouse (*Peromyscus maniculatus*) (Table 3.4.1).

Table 3.4.1 Small mammal trapping results for the Red Bank Project area.

Species	Number Trapped	Percent of catch
Deer mouse	9	36
Pinon mouse	4	16
Brush mouse	3	12
Western harvest mouse	6	24
California vole	1	4
Dusky footed woodrat	1	4
Bushy tailed woodrat	1	4
TOTALS	25	100

3.4.2 Mist Netting

A total of 60 hours of mist netting effort was expended to detect the bat species present on the Red Bank Project area. Nets were typically monitored from sunset to approximately midnight. Surveys were conducted over water sources (i.e., ponds, permanent or intermittent streams and creeks, and water troughs), near forest or woodland edges, at openings to outbuildings, and across canyons and steep draws. All together, four bat species were captured. The most commonly captured species was the Yuma myotis (*Myotis yumanensis*) (Table 3.4.2).

3.4.3 Acoustical Surveys

A total of 37 hours of acoustical surveys were expended to survey free-flying bat species on the Red Bank Project area. These surveys detected two additional species that were not captured during the mist netting efforts, the Mexican free-tailed bat (*Tadarida brasiliensis*) and western pipistrelle (*Pipistrellus hesperus*).

Table 3.4.2 Mist netting results for the Red Bank Project area.

Species	Number caught	Percent of capture
Yuma myotis	3	44
Pallid bat	1	14
Western red bat	1	14
Big brown bat	1	14
Hoary bat	1	14
TOTALS	7	100

In addition, acoustical surveys provided valuable planning information for biologists by identifying areas of high activity. Those areas of high activity were documented and then visited during the day to see what, if any, features were present. Depending upon the site, mist netting efforts could then be implemented to capture bats using those areas of high activity. A complete list of species detected with the Anabat is not available at this time because calls are still being analyzed.

3.4.4 Roost Searches

A total of 13 hours was expended to locate active and/or potential roost sites on the Red Bank Project area. To date, three buildings, five rock outcrop areas, and four tree cavities were searched and/or monitored for bat use. So far, biologists have identified one active day roost site. The roost was occupied by a myotis species. Species observed at the roosts were visually identified, where possible, with minimal disturbance and not handled. This practice was conducted so as not to disturb the bats to the point of roost abandonment, which has been a major factor in the decline of many bat species in California.

3.4. Track Plates

A total of 133 nights of effort was expended to detect the presence of medium-sized mammals: 33 nights in blue oak/digger pine, 32 in foothill pine, 43 in oak savanna, and 25 in riparian. Surveys resulted in a total of 10 detections: 8 woodrats, 1 raccoon, and 1 black bear. Attachment B contains some representative tracks from the track plates.

3.4.6 Photo Stations

A total of 55 nights of effort was expended to detect the presence of medium-sized mammals: 10 nights in blue oak/digger pine, 18 in foothill pine, 18 in oak savanna, and nine in riparian. This technique was conducted in conjunction with the track plate efforts. Both 35mm still cameras and 8mm video camera setups were used. The video surveillance system efforts were conducted in the blue oak/digger pine habitat while the 35mm cameras were used in the other habitat type efforts. The video efforts resulted in approximately 20 minutes of footage of black bears from four detections and the

35mm camera efforts resulted in five detections; three black bears and two deer. Attachment C contains some representative photographs from the photo stations.

3.4.7 Spotlighting

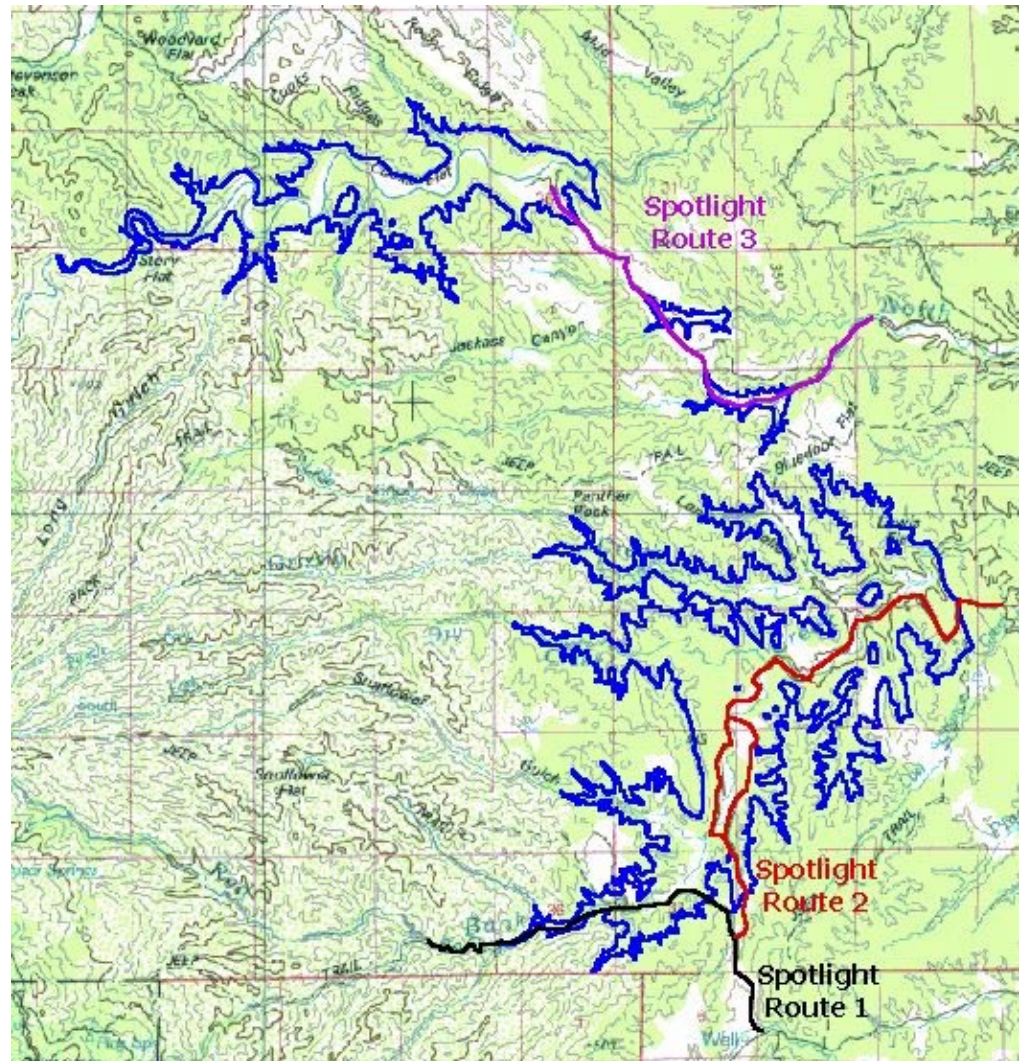
The primary focus was on identifying suitable routes for implementing standardized, permanent spotlighting efforts. Biologists mapped potential routes and classified them based upon the type of road (county, private, gravel, paved, dirt, etc.). While there are fairly extensive road systems throughout the project area, the majority will most likely be accessible only seasonally unless some improvements are made. Three potential routes have been identified (Figure 8), of which only one may be accessible year round without some improvements. Spotlighting will only be conducted on a limited basis because the project area is primarily oak woodland. Dense woodlands are not very conducive to spotlighting efforts so more emphasis will be put on track plates and photo stations in future studies.

Preliminary spotlighting efforts detected the presence of black-tailed mule deer (*Odocoileus hemionus columbianus*), black-tailed hares (*Lepus californicus*), and kangaroo rat species (*Dipodomys* species).

3.4.8 Habitat Assessment

While conducting the track plates and photo stations, it was determined that the potential habitat for the pine marten (*Martes americana*) and Pacific fisher (*Martes pennanti pacificus*) was marginal in the Red Bank Reservoir footprint. The site is dominated by relatively open foothill pine and oak woodlands interspersed with grasslands and chaparral. The pine marten (*Martes americana*) prefers dense, late-successional coniferous forests with thick understories, which are not present in this alternative (see Section 6.14 for the complete life history of the pine marten). The Pacific fisher (*Martes pennanti pacificus*) prefers large stands of mature trees with at least 50 percent canopy cover, typically coniferous and hardwood forests, which occurs sporadically in this alternative (see Section 6.15 for the complete life history of the Pacific fisher).

Figure 8. Potential spotlight routes on the Red Bank Project area.



4.0 Summary

Field investigations were designed and focused to detect the presence and distribution of special status species within the footprint of the alternatives in order to provide decision-makers with some baseline information that might assist with assessing potential mitigation requirements. As the studies progressed, modifications were made to address the presence and distribution of all mammal species in the alternatives in attempt to assess the cumulative potential impacts that would result from project construction. Surveys were restricted to the inundation zones of the reservoirs so potential impacts associated with conveyance facilities, road realignments, and other appurtenant facilities are not addressed in this report.

Literature searches, species habitat requirement reviews, range maps, and consultation with State and federal species experts revealed that 16 special status mammal species potentially occurred in the alternatives (Section 2). Database searches revealed that four of those species have been documented to occur in or near the four project areas (Table 4.1). The San Joaquin pocket mouse is the only species documented to occur within the footprint of one of the project areas, Sites. The other records were of documented occurrences outside of the footprint of the project areas. The species documented outside of the footprints were included because there is potential habitat within the alternatives to support these species and construction of the reservoir and/or appurtenant facilities could impact them.

Table 4.1 Historical sightings of special status mammal species by project area.

Species	Sites	Colusa Cell	Thomes-Newville	Red Bank
Townsend's western big-eared bat	X	X		
Pale big-eared bat				X
Pacific fisher	X	X	X	
San Joaquin pocket mouse	X	X		

In addition to the historical records listed, field investigations documented the occurrence of six special status mammal species in the four project areas (Table 4.2). The pallid bat (*Antrozous pallidus*) was documented in all four of the project areas; the American badger (*Taxidea taxus*) and Yuma myotis (*Myotis yumanensis*) were documented in three; the western red bat (*Lasiurus blossevillii*) and ringtail (*Bassariscus astutus*) were documented in two; and the San Joaquin pocket mouse (*Perognathus inornatus inornatus*) was documented in only one of the project areas. The failure to observe the San Joaquin pocket mouse (*Perognathus inornatus inornatus*) in the Sites Project area despite the historical records is unexplainable.

Table 4.2 Special status species documented during our field efforts by project area.

Species	Sites	Colusa Cell	Thomes-Newville	Red Bank
Yuma myotis	X		X	X
Western red bat	X		X	X
Pallid bat	X	X	X	X
Ringtail	X		X	
American badger	X	X	X	
San Joaquin pocket mouse			X	

During the small mammal trapping efforts, mark recapture studies were conducted, but because of the inadequate funding, an insufficient number of samples were able to be collected. In addition, stratified sampling did not take place because DFG felt it was more important at this stage to continue targeting potential San Joaquin pocket mouse (*Perognathus inornatus inornatus*) habitats. For the mark recapture samples we collected, nine were collected on Sites and four were collected on Thomes-Newville. In the Sites Project area, four samples were collected in grassland and five samples were collected in oak savanna habitats. In the Thomes-Newville Project area all four samples were collected in grassland habitat. Because of the low number of samples collected, there is no merit in reporting the abundance calculations at this time. The calculations from these efforts will help biologists plan out future study needs and make recommendations.

During the photo station and track plate efforts, field personnel concluded that suitable habitat for the pine marten (*Martes americana*) and Pacific fisher (*Martes pennanti pacificus*) did not occur in the Sites, Colusa Cell, or Thomes-Newville inundation zones of the project areas. It was also determined that marginal, patchy habitat was present in the Red Bank inundation zone of the project area.

The information contained within this report and the 1983 *Thomes Newville Unit Fish and Wildlife Evaluation - A Status Report* and the 1987 *Final Report on Reconnaissance Level Studies of the Fish and Wildlife Resources at the Dippingvat and Schoenfeld Reservoir Sites* are not sufficient for compliance with the State and federal Endangered Species Acts, CEQA, and NEPA. The information contained within the species accounts, however, can be used in the preliminary evaluation of alternative sites and could also be helpful in the preliminary screening of additional storage alternatives.

5.0 Recommendations

At this stage of our investigations, DFG has several recommendations to assist with future planning efforts. Our recommendations are based upon discussions with DWR and the collective goal of developing an adequate EIR/EIS. To that end, DFG recommends expanding the current level of effort to become more comprehensive, extending the timeline to allow for necessary studies and evaluations to take place, and providing the access necessary to complete the required evaluations.

Current efforts have provided biologists with insight into the presence of some of the special status mammal species but there remain inadequacies in the level of effort for the alternatives, especially for the purposes of determining project feasibility. To determine the EIR feasibility and complete an adequate EIR/EIS, the various components (conveyance facilities, potential recreation areas, road relocations, areas downstream of each alternative, and the project area right-of-ways) of the project alternatives need to be identified and evaluated so that the cumulative potential impacts can be determined. In addition, studies should be expanded to go beyond the current reconnaissance level of effort, to address all mammal species. Insight into potential impacts has been gained by literature review and discussions with DFG unit biologists, but additional studies are needed to adequately address impacts to species that are not covered under the special status surveys. This would include addressing deer, other game species, rodents (the prey base for many of the special status species), as well as general wildlife. Once we have expanded our efforts to address the cumulative potential impacts for all species, we can adequately address the State and federal Endangered Species acts, CEQA and NEPA, develop a mitigation strategy, and develop a biologically and legally defensible EIR/EIS.

In order to complete the EIR/EIS, we believe the timeline should be extended into mid-2004. The expanded studies that need to occur will require additional time to be completed. The current, proposed timeline for completing the EIR/EIS is infeasible given the level of funding available to conduct the environmental studies. Attachment D contains a timeline that DFG believes is more realistic, especially given the pattern of available funding over the past three years of the studies. Attachment E contains a proposed budget to complete the studies outlined in the timeline.

To accomplish the expanded surveys discussed, action will need to be taken to provide suitable vehicular access to the alternatives throughout the year for the project areas. In addition, timely possession and receipt of the Temporary Entry Permits for the project areas will be imperative. Ideally, the TEPs would be executed for the life of the studies (for example, the timeline in Attachment D). Continuous access to all areas will allow for a uniform effort at each of the alternative reservoir sites and will be important for conducting comparisons between the alternatives.